

REMARKS

Rejection Under 35 U.S.C. § 103(a)

Claims 1-8 and 17 stand rejected on the grounds that they are obvious over U.S. Patent No. 6,159,778 to Kim in view of U.S. Patent No. 5,245,208 to Eimori.

The claimed invention patentably defines over each of Kim, Eimori and their combination. With respect to Kim, Kim fails to teach or suggest the claimed invention for at least two reasons.

First, Kim does not disclose the claimed asymmetrical junctions. As is provided in claim 1, the source/body junction is an abrupt or hyperabrupt junction, and the drain/body junction is a graded junction. In Kim, the semiconductor junctions are formed with no mention of asymmetrical junction formation (col. 4, lines 19-31). In addition, the lightly doped source region 24a disposed between the more heavily doped source region 26a and the body 27 inherently introduces grading to the source/body junction.

Second, claim 1 requires that the semiconductor active region is disposed on the insulator layer. In contrast, Kim's semiconductor active layer 10 is partially disposed on a field oxide isolation region 12 and partially on a refractory metal silicide region 16, which, in turn, are disposed on the insulating layer 18. The Kim silicide 16 is disposed under and in contact with the source, source/body junction and a portion of the body.

As is well known, silicide is highly conductive and its presence introduces operational differences between the claimed device and the Kim device.

Namely, in Kim, non-rectifying junctions are formed between the source and the body (col. 3, lines 27-35). The silicide lowers a barrier between the source and body to assist Kim in removing excess carriers (i.e., holes) from the body (col. 4, lines 36-43). Therefore, Kim's approach to reducing floating body effects is to include the silicide layer between the source side of the active region and the buried insulation layer. As a result, there is no motivation to modify Kim so that the semiconductor layer is disposed directly on the insulator layer or to modify the drain/body junction to assist in reducing floating body effects.

Eimori does not cure the above noted deficiencies of Kim as a teaching reference. Eimori does not disclose the claimed asymmetrical source and drain regions. Eimori provides no express teaching to form an asymmetric device. Nor does Eimori provide any suggestion to modify Eimori to form an asymmetrical device, especially given the strong preference by integrated circuit (IC) designers for symmetrical devices where the source and drain can be used interchangeably. This interchangeability adds flexibility to implementing circuits where multiple transistors are interconnected. Although the present invention is directed to an asymmetrical device, it is believed that the performance enhancements attained with the claimed structure will be beneficial to the IC designer.

Accordingly, even if one were to combine the references as proposed by the Examiner, the claimed invention would not result.

In addition, motivation to combine the references is lacking.

The present invention is directed to reducing floating body effects. As should be readily apparent, floating body effects result from the contactless body that is separated from the substrate by the insulating layer. In contrast, Eimori is a bulk device where the body is electrically connected to the substrate so that floating body effects are not a concern.

More importantly, Eimori does not recognize the problem of floating body effects nor address how to reduce floating body effects. Rather, it is the stated objective of Eimori to decrease short channel effects and decrease hot carriers (col. lines 25-32).

In addition, the Examiner states that it would have been obvious to combine the reference because both are from the same field of endeavor of semiconductor devices, and the purpose disclosed by Eimori would have been recognized in the pertinent art of Kim. As explained above, the purpose proposed by the Examiner would not be apparent since Eimori does not address the problem addressed by the present invention.

Also, the Examiner's statement fails to provide any objective indication of a motivation to combine the references. The Examiner's statements are conclusory and it is well documented that such statements fail to establish a prima facie case of obviousness. As indicated, it is not seen in the references that there is any motivation for

their combination. Eimori is not an SOI device suffering from floating body effects and the Examiner has not indicated why one of ordinary skill in the art would turn to Eimori to modify Kim.

Accordingly, claim 1 and the claims depending therefrom are considered to be allowable. In addition, the dependent claims recite additional novel and unobvious features of the present invention.

For example, claim 17 specifies that the graded drain/body junction is less abrupt than the source/body junction. However, even if one were to assume that the Kim or Eimori source/body junctions are abrupt or hyperabrupt junctions, Kim nor Eimori disclose that the drain/body junction is less abrupt than the source/body junction.

Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) is requested.


Conclusion

In light of the foregoing, it is respectfully submitted that the present application is in a condition for allowance and notice to that effect is hereby requested. If it is determined that the application is not in a condition for allowance, the Examiner is invited to initiate a telephone interview with the undersigned attorney to expedite prosecution of the present application.

If there are any additional fees resulting from this communication, please charge same to our Deposit Account No. 18-0988, our Order No. F0541.

Respectfully submitted,

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